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INNOVATIVE TEACHING PRACTICES AT SCHOOL LEVEL MATHEMATICS

By Prof. Prakash R. Ahire,
Ashoka Education Foundation,
Ashoka College, Nashik.

ABSTRACT:

Instead of teaching students, develop interest in the Mathematics they do not like, Let us make math that, students will love to learn. This Paper will reflect about the effective & concrete learning of mathematics by the use of self devised innovative activities, worksheets, projects, experiments & teaching aids. The research will be to show if maximum participation of students is ensured either in the mathematics laboratory activities or class room interactive questioning sessions like that of quiz, a joyful learning of the subject takes place. "Learning by doing" is very effective methodology in teaching learning process as the experience gained meticulously, remains permanently affixed in the minds of the children .So innovative teaching aids & projects of math's laboratory plays a vital role in the conceptualization process.

KeyWords : Resources,Innovative methods, Pedagogic Resources

Introduction:

As the NCF 2005 emphasizes that children's experience of school education must be linked with the life outside the school ,so that learning experience is pleasurable. Having had this in mind, several opportunities are provided to students to construct their systematic knowledge by engaging them in activities, experiment, projects field visits, discussion with peers & teachers, group work, brain storming sessions, collecting information from different sources, enquiring, listening , thinking etc. The students are provoked & allowed to share & explain their ideas & to ask, raise, pose & frame questions. Appropriate innovative tools & techniques are applied depending upon the situation & requirement of the underlying concepts. The innovative Math-lab activities, Teaching-aids, & projects designed by the teacher are used for the research work. The students of the classes VI, VIII.IX & X can be considered. It is my experience that the students learn better without stress and fear due to following activities.

1. Mathematical stories to create interest in the Subject.
2. Use of innovative teaching aids in classroom.
3. Self-framed worksheets from simple to complex to re-teach the difficult concepts for slow learners.
4. Some interesting games and puzzles designed to motivate the students to love mathematics.
5. Some innovative techniques used in class-room teaching-learning process to remove math-phobia.
6. Self-written hand-outs are provided to students to remove common misconception.
7. Innovative Remedial Measures are adopted according to the type of errors committed by the students in their Formative Assessments.
8. With the help of Mathematical charts maintained by every child from class VI to class X, suitable and appropriate activities can be carried out by the students under the guidance of the Maths teacher. The activities end up with a number of questions so that the aim of the activity can be clearly fulfilled by each and every child in the class. The students can perform some of the activities in groups too, for example while playing mathematical games a lot of peer learning takes place.
9. Instead of giving the exact or accurate solution for the problems many times open-ended questions may be preferred which ensures a wider scope for thinking and reasoning .
10. Special attention is given to the solved examples of the textbook which simplify the concepts.
11. For homework or assignment questions referred as per Booklet prepared by Math's Teacher.

Teaching of mathematics in the class is not only concerned with the computational knowledge of the subject but is also concerned with the selection of the mathematical content and communication leading to its understanding and application. So while teaching mathematics one should use the teaching methods, strategies and pedagogic resources that are much more productive in in advance adequate responses from the students than we have ever had in the past. We know that the teaching and learning of mathematics is a complex activity and many factors determine the success of this activity. The nature and quality of instructional material, the presentation of content, the pedagogic skills of the teacher, the learning environment, the motivation of the students are all important and must be kept in view in any effort to ensure

quality in teaching-learning of mathematics. In this paper Author discuss the efforts, made for innovations and innovative practices in teaching mathematics, under teaching methods, strategies and pedagogic resources to make a joyful learning .

Aims of Teaching Mathematics at School Level :

1. To develop the mathematical skills like speed, accuracy, neatness, estimation, etc. among the students.
2. To develop their logical thinking, reasoning power, analytical thinking, and critical thinking.
3. To develop their level of decision-making.
4. To develop the methods of problem solving.
5. To recognize the adequacy or inadequacy of given data in relation to any problem on individual basis.
6. To develop their scientific attitude i.e. to estimate, find and verify results.
7. To develop their ability to analyze, to draw inferences and to generalize from the collected data and evidences.
8. To develop their heuristic attitude and to discover solutions and proofs with their own independent efforts.
9. To develop their mathematical perspective and outlook for observing the realm of nature and society.

Need & Importance for Innovative practices in Teaching Mathematics :

In view of the foregoing aims of teaching mathematics I become conscious that more focus should be given in class room to the higher level of objectives underlying the mathematics subject, like critical thinking, analytical thinking, logical reasoning, decision-making, problem-solving. Such objectives are difficult to be achieved only through verbal and mechanical methods that are usually used in the class of mathematics. The Education Commission (1964-66) points out that "In the teaching of Mathematics emphasis should be more on the understanding of basic principles than on the mechanical teaching of mathematical computations". . Innovations in Teaching Mathematics Innovations in teaching of mathematics can be diversified in terms of Methods.

1. Mastery Learning Strategy Teaching Strategy is a generalized plan for a lesson and includes a specific structure to be followed. B.S. Bloom has developed Mastery Learning Strategy. It

consists of different steps: division of content into units, formulation of objectives related to each unit, teaching and instruction are organized for realizing objectives of each unit, administering unit test to evaluate the mastery level and diagnose the learning difficulties, remedial instructions are given to remove the difficulties and attain mastery level by every student. This strategy plays an important role for learning of basics and fundamentals e.g. operations in different number systems – Natural numbers, Whole numbers,Integers, Rational numbers, Real numbers.

2. The following are the innovative methods that Author used to make teaching-learning process of Mathematics effective. Inductive -Deductive Method
3. In classroom usually the instructions directly start with the abstract concepts and are being taught in a way that does not bring understanding on the part of majority of the students. Formulas, theorems, examples, results are derived, proved and used. But Author start with specific examples and concrete things and then move to generalizations and abstract things. Then Author shows how generalization can be derived and it holds true through specific examples. This method helps students for better understanding, Students don't have to study the things and will have long lasting effect. Example: Pythagoras Theorem.
4. Analytic-Synthetic Method : These methods are basically used in proving the results and solving sums. In textbooks mostly Synthetic method is used, to prove something unknown we start with a certain known thing, but that leaves doubt in mind of students why we have started with that step and using this particular known thing. we use combination in order to explain and relate each step logically.
5. Problem-Solving Method :This method aims at presenting the knowledge to be learnt in the form of a Problem. It begins with a problematic situation and consists of continuous meaningful well-integrated activity. Author choose a problem and give it to my students and engage them without spending time in going over the things. As they struggle with the problem to get solution, meanwhile it helps them in developing divergent thinking. Example: Mensuration Problems.
6. Play-Way Method : Author tries to use the activities that include a sort of fun or play and give joy to the students in my class room teaching . As the students don't realize that they are learning but in a way they are gaining knowledge through participating in different activities. This way helps to develop interest in mathematics, motivates them to learn more and reduces the abstract nature of the subject to some extent naturally. Example: Mathematical games and

puzzles.

7. Laboratory Method : Author Practice the teaching in class through the way of "learning by doing" and "learning by observation" and Proceeding from concrete to abstract. All students do not just listen to the information given but they Practically also. They learn through hands on experience. This way leads them to discover mathematical facts. After discovering something by their own efforts, the they start getting Pleasure in his achievement, it gives them in return happiness, mental satisfaction and encourages them towards further achievements. Example: Making and observing models, Paper folding, Paper cutting, construction work in geometry.

Pedagogic Resources :

Author use pedagogic resources in teaching practice to integrate in a method for the transaction of a particular content and draw upon to advance the students' learning. Teaching aids are the materials used for effective teaching and enhancing the learning of students. It can be anything readymade or made by the teacher or made by students. Different teaching aids are used by me in teaching mathematics like Charts, ,Programmed Learning Material (ICT), Computers etc.

*Charts : are used in class to display formulae, symbols, mathematical and geometrical figures. Charts are used for making students familiar to the symbols and for memorization of basic formulae. Even it is used to bring to the students two-dimension geometry and the graphical representation in a better way. Models can be used to make things concrete like three dimension figures in geometry.

* Programmed Learning Material (ICT) : It is a self-learning material in which learner can proceed at his own pace. It has the characteristics of all sequential steps, learner's response, self-pacing, immediate feedback, reinforcement and self-evaluation. It is helpful in acquisition of concepts like fractions, number systems, etc. and can be used as a remedy for slow learners for a specific content.

* Computers and Television : Computer can be used for multimedia presentation for the concepts that requires visualization and imagination. Computer can also be used for providing Computer Assisted Instruction (CAI), it is similar to PLM i.e. it is a computerized PLM. Television can be used to show some good mathematics education show.

*Activities :Activities here include all such work where in students play an active role, Have to interact with different resources and generate knowledge. It includes Quiz competition, Projects,

Role play, Seminars, Discussion, Mathematics club, Assignment, Field trips, etc. Name of the Activity Examples/Situations where Activity can be used Quiz Competition Logic, Properties of Numbers, Mathematical Rules and Results Projects Contribution by Different Mathematicians Role Play Arithmetical concepts like Profit & Loss, Simple & Compound Interest Seminars Shortcuts through Vedic Mathematics, Implementation of Mathematics in other Disciplines ,Mathematics Clubs , Application of the concept studied, Preparing Models, Paper Folding (Origami) Assignment Self-Study, Extension of Knowledge Field Trips Experiencing the Functional use of Mathematics in Bank, Insurance Company In any curriculum, content and presentation of content are the two most important and inseparable components. It is difficult to say anything definitely about which method and pedagogic resource is going to be most effective for presentation of a particular type of content. Selection of method and pedagogic resource depends on many factors like type of content, objectives to be achieved, level of the students, entry behaviour, availability of resources etc.

Guidelines for a Teacher in Incorporating Innovations in Teaching Mathematics:

1. For successful transaction of the curriculum and achievement of curricular objectives appropriate method and pedagogic resources should be used in providing learning experiences to the students. .
2. A number of factors need to be considered while making use of a particular method and pedagogic resource: learners' capabilities, availability of resources, entry behavior, school environment, objectives to be achieved, the nature of content and the teacher's own preparation and mastery.
3. The immediate environment of the learner both natural and human should be used when and where possible for making learning concrete and meaningful.
4. Involve the students in the process of learning by taking them beyond the process of listening to that of thinking, reasoning and doing.
5. In order to promote self-study skills use of library and resource center needs to be encouraged.
6. Receiving regular feedback for teaching and learning should be an inbuilt component of teaching-learning process. Continuous and comprehensive evaluation has to be ensured as it plays an important role for the required modification in teaching-learning process. 8.
7. Properly instruct and guide the students for carrying out different activities and precautionary

measures should be taken so that students are not misguided.

8. Study mathematical journals and modern books of professional interest. Any facilities of in-service training should be availed of for improving teaching of mathematics.

Conclusion:

The teacher should ask himself two questions: Is there some new way in which I can present this material in order to make it more meaningful and more interesting?' & 'What activities, demonstrations, teaching aids, etc. would enrich the classroom presentation and direct attention of students to the important elements?' Once the teacher discovers innovative ways to arouse interest and enthusiasm in the class, Maths Teacher will be able to use these ideas again the following year, since those will be new and fascinating to a different class. But teacher should keep in mind that as time passes, the world undergoes a change, the environment surrounding students changes and their needs also changes, so one has to continuously go on modifying and discovering new ways of teaching which proves him a Skilled teacher.

As the present study review that Innovative teaching were effective for teaching Mathematics hence various teaching methods should be used by the school teacher in class room teaching in teaching Mathematics. In order to orient the interest of teachers more innovative methods should be used like use of ICT . More class room teaching, workshops and seminars should be organized for teachers to help students in academics.

References:

1. Aggarwal, S.M. (2010).Teaching of Modern Mathematics. New Delhi: Dhanpatrai Publishing Company.
2. Aggarwal, Y.P. (1986). Statistical Methods. Concepts Application and Computation. New Delhi: Sterling Publishers.
3. New Best, J.W. (1963).Research in Education. New Delhi: Prentice Hall of India.
4. Buch, M.B. (1987).Third Survey of Research in Education, Society for education research and development. Baroda.
5. Buch, M.B.(1988-1992).Fifth Survey of Research in Education. New Delhi: NCERT.
6. Dayal, D. (2007). Modern methods of teaching Mathematics. Delhi: A P H Publishing Corporation.
7. PAPOLA, C. (2006). Teaching of Mathematics. New Delhi: Anmol publications.
8. Swaroopa Rani, T. (2008). Research in Teaching of Mathematics. New Delhi: A P H Publishing Corporation.